



PLATELET-TO-LYMPHOCYTE RATIO IN DIAGNOSIS OF ACUTE COMPLICATED APPENDICITIS IN CHILDHOOD

ÇOCUKLUK ÇAĞI AKUT KOMPLİKE APANDİSİT TANISINDA PLATELET LENFOSİT ORANI

PLR IN ACUTE COMPLICATED APPENDICITIS

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Öz

Amaç: Akut komplike apandisit tanısının geç veya yanlış konulması morbidite ve mortaliteyi arttırabilmektedir. Bu çalışmamızda amacımız, akut komplike apandisit tanısında platelet lenfosit oranının kullanılabilirliğini test etmektir. **Gereç ve Yöntem:** 55 nonkomplike ve 16 komplike apandisit tanılı hastanın dosyaları incelendi. Bu hastaların hematolojik verileri kullanıldı. **Bulgular:** Hastaların yaşları 10.6 ± 3.9 yıl idi. Komplike apandisit tanılı olguların platelet sayısı (271 ± 71 vs. 365 ± 105 , $p=0.003$), MPV değeri (7.8 ± 1 vs. 7.1 ± 0.7 , $p=0.006$) ve platelet lenfosit oranı (174 ± 104 vs. 217 ± 65 , $p=0.031$) nonkomplike olanlara göre anlamlı oranda farklı idi. Akut komplike apandisit olgularında platelet lenfosit oranı için cut-off değeri 195 olarak saptandı (%95 CI (0.54-0.81, $p=0.031$)) (Sensitivite %62.5, spesifisite %61.8). **Tartışma:** Platelet lenfosit oranı komplike ve nonkomplike akut apandisitleri birbirinden ayırbilecek basit bir testtir.

Anahtar Kelimeler

Platelet Lenfosit Oranı; Komplike Apandisit; Nonkomplike Akut Apandisit; Çocuk

Abstract

Aim: Late or misdiagnoses of acute complicated appendicitis may increase the morbidity and mortality. In this study, we aimed to test the utility of Platelet-to-Lymphocyte ratio in early diagnosis of acute complicated appendicitis. **Material and Method:** The records of 55 noncomplicated and 16 complicated acute appendicitis cases were evaluated. Hematologic data of the cases were used. **Results:** The mean age of the patients was 10.6 ± 3.9 years. Platelet (271 ± 71 vs. 365 ± 105 , $p=0.003$), MPV (7.8 ± 1 vs. 7.1 ± 0.7 , $p=0.006$) and Platelet-to-lymphocyte ratio (174 ± 104 vs. 217 ± 65 , $p=0.031$) were significantly different in complicated appendicitis. In diagnosis of complicated acute appendicitis, the cut-off value for Platelet-to-lymphocyte ratio was determined as 195 (95% CI (0.54-0.81, $p=0.031$)) (sensitivity 62.5% and specificity 61.8%). **Discussion:** Platelet-to-lymphocyte ratio is an easily available test that can be used in differentiation of complicated acute appendicitis from noncomplicated in children.

Keywords

Platelet-To-Lymphocyte Ratio; Complicated Appendicitis; Noncomplicated Appendicitis; Child

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Introduction

Acute appendicitis is one of the most common situations requiring urgent surgical intervention in childhood [1,2]. Late or misdiagnoses may increase the morbidity and mortality. Diagnosis in patients presenting with typical symptoms is relatively easy. However, 40% of acute appendicitis cases present with atypical symptoms [3].

Laboratory tests such as C-reactive protein (CRP), white blood cell count (WBC) [4,5] and MPV [6] and imaging techniques such as ultrasonography or computed tomography [7] facilitate diagnosis. With the increase in the number of tests, the cost is also increasing. Despite the evolutions in diagnostic methods in recent years, there is a perforation rate of 19% and misdiagnosis rate of 10% in acute appendicitis in children [8]. For that reason, more simple and trustworthy parameters are needed. Platelet-to-lymphocyte ratio (PLR) is a novel inflammatory marker. It has been used in previous studies [9-11]. To the best of our knowledge, PLR was used only in one adult acute appendicitis study [12]. In the present study, our aim was to test the utility of PLR in diagnosing complicated acute appendicitis in children.

Material and Method

The records of patients who were hospitalized in the pediatric surgery department of Abant İzzet Baysal University Medical Faculty between January 2015 and April 2016 with the diagnosis of acute appendicitis were retrospectively evaluated. These patients, who were operated on with conventional methods, were divided into two groups as noncomplicated or complicated regarding the presence of phlegmon, abscess, or perforation. The laboratory data (hemoglobin, platelet, MPV, WBC, neutrophil, lymphocyte, and CRP) of included patients were investigated. PLR and neutrophil-to-lymphocyte ratio were calculated. The data were analyzed with the Statistical Package for Social Sciences (SPSS, Inc., Chicago, IL) for Windows 16.0. The data were expressed as mean ± standard deviation. In statistical evaluations, Student-t, Mann-Whitney U tests, and ROC curve analyses were performed. The p value of <0.05 was considered as statistically significant.

Results

In total, 71 patients were investigated in the study period: 40 (56.3%) were male while 31 (43.6%) were female. The mean age of the patients was 10.6±3.9 years (3-17 years). Sixteen (22.5%) of the cases were diagnosed as acute complicated appendicitis. Six (37.5%) were male while 10 (62.5%) were female; the mean age was 9.7±4.4 years in this group. Platelet and MPV values were found to be significantly different in complicated appendicitis (271±71 vs. 365±105, p=0.003 and 7.8±1 vs. 7.1±0.7, p=0.006, respectively). There was not any difference between the other variables (Table 1). When compared with the noncomplicated appendicitis cases, PLR was significantly higher in complicated appendicitis (174±104 vs. 217±65, p=0.031). In diagnosis of complicated acute appendicitis, the cut-off value for PLR was determined as 195 (95% CI (0.54-0.81, p=0.031). For that cut-off value, sensitivity was 62.5% and specificity was 61.8% (Figure 1).

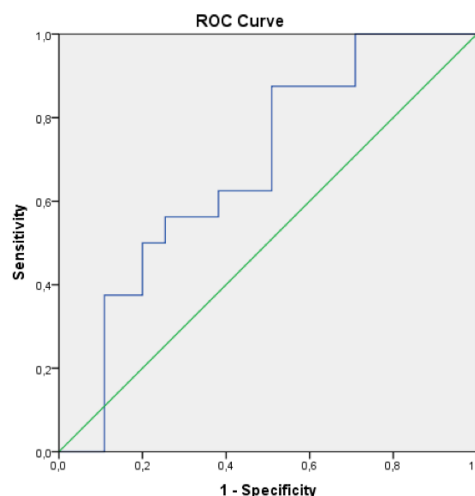


Figure 1. ROC curve for PLR in acute complicated appendicitis

Table 1. The characteristics of patients with complicated and non-complicated acute appendicitis

	Non-complicated appendicitis (n=55)	Complicated appendicitis (n=16)	p
Age (Years)	10.8±3.7	9.7±4.4	0.32
Gender (n)	Male	34 (%61.8)	6 (%37.5)
	Female	21 (%38.2)	10 (%62.5)
Hemoglobin (g/dl)	12.9±1.2	12.3±0.8	0.055
Platelet (/µl)	271±71	365±105	0.003
MPV (fl)	7.8±1	7.1±0.7	0.006
CRP (mg/dl)	50.1±33.6	55.4±49.7	0.75
WBC (x10 ³ /µl)	13.7±4.3	16.6±7.7	0.21
Neutrophil (x10 ³ /µl)	10.8±4.2	13.8±7.5	0.19
Lymphocyte (x10 ³ /µl)	2±1.2	1.8±0.6	0.71
N/L	7.2±5.4	8.4±4.9	0.28
P/L	174±104	217±65	0.031*

(Y:Years, *:Mann-Whitney U)

Discussion

Acute phase reactants have been investigated in the diagnosis of acute appendicitis due to their lower costs [4,5]. On the other hand, there are also studies reporting low sensitivity and specificity rates of these parameters in inflammatory conditions [13]. In our study, we have determined significantly increased MPV and PLR in acute complicated appendicitis. MPV is associated with platelet function and activation [14]. It is higher in infections due to increased platelet production [15,16]. However, there are also publications suggesting that MPV is reduced during acute inflammation and increased with treatment [17,18]. Late presentation of these patients to the hospital increases the risk of complications. Albayrak et al. [6] found MPV values to be lower in the patients who presented late. In another study, MPV was found to decrease in all pediatric acute appendicitis cases [19]. We believe that decrease in the values of MPV is associated with late presentation in acute complicated appendicitis. PLR is expressed as a marker for the diagnosis of acute ap-

pendicitis [12]. Increased PLR is associated with reactive thrombocytosis and/or lymphopenia. Reactive thrombocytosis can be seen in the course of infectious diseases depending on the increased cytokines [20]. Lymphopenia is associated with increased neutrophil and decreased lymphocyte production in bone marrow [21-23]. In our study, the cause of the increase in PLR is reactive thrombocytosis.

Our study also showed that PLT is a useful marker not only in the diagnosis of acute appendicitis but also in diagnosing complicated appendicitis in childhood. It is a better parameter than the other acute phase reactants. The best cut-off value of PLR that can differentiate complicated appendicitis was determined as 195 (62.5% sensitivity and 61.8% specificity).

PLR can also be a useful marker to distinguish complicated appendicitis from noncomplicated appendicitis. The best cut-off value of PLR > 195 may differentiate complicated acute appendicitis from noncomplicated cases. Limitations of the present study include the retrospective design and the small sample size. Prospective and larger studies are needed to evaluate the use of this parameter in diagnosis.

Competing interests

The authors declare that they have no competing interests.

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